



**STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION**

**2800 BERLIN TURNPIKE, P.O. BOX 317546
NEWINGTON, CONNECTICUT 06131-7546**



Phone: 860-594-3128

October 5, 2016

Subject: Project No. 14-179

F.A.P. No. 0139(037)

Replacement of Bridge No. 01358 Route 139 over Branford River in the Town of Branford.

NOTICE TO CONTRACTORS:

This is to notify all concerned and especially the prospective bidders that the bid opening for the subject project has been previously postponed to October 12, 2016 at 2:00 P.M. in the Conference Room of the Department of Transportation Administration Building, 2800 Berlin Turnpike, Newington, Connecticut.

Addendum No. 1 is attached

The Department has established a general mailbox to receive contractor questions. Please send all future questions to DOTContracts@ct.gov

Philip J. Melchionne

For: Gregory D. Straka

Contracts Manager

Division of Contracts Administration

OCTOBER 5, 2016
REPLACEMENT OF BRIDGE NO. 01358 ROUTE 139 OVER BRANFORD RIVER
FEDERAL AID PROJECT NO. 0139(038)
STATE PROJECT NO. 14-179
TOWN OF BRANFORD

ADDENDUM NO. 1

This Addendum addresses the following questions and answers contained on the “CT DOT QUESTIONS AND ANSWERS WEBSITE FOR ADVERTISED CONSTRUCTION PROJECTS”:

Question and Answer Nos. 1 thru 32

SPECIAL PROVISIONS
NEW SPECIAL PROVISIONS

The following Special Provisions are hereby added to the Contract:

- ITEM NO. 0202647A – UTILITY MONITORING POINT
- ITEM NO. 0202911A – CONDITION SURVEY (SITE NO. 1)
- ITEM NO. 0904051A – 3 TUBE CURB MOUNTED BRIDGE RAIL
- ITEM NO. 0922515A – TEMPORARY CONSTRUCTION ACCESS ROAD

REVISED SPECIAL PROVISIONS

The following Special Provisions are hereby deleted in their entirety and replaced with the attached like-named Special Provisions:

- CONTRACT TIME AND LIQUIDATED DAMAGES
- ITEM NO. 0503001A – REMOVAL OF SUPERSTRUCTURE
- ITEM NO. 0707009A – MEMBRANE WATERPROOFING (COLD LIQUID ELASTOMERIC)

DELETED SPECIAL PROVISION

The following Special Provision is hereby deleted in its entirety:

- ITEM NO. 0922509A – TEMPORARY CONSTRUCTION ACCESS ROAD

CONTRACT ITEMS**NEW CONTRACT ITEMS**

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>UNIT</u>	<u>QUANTITY</u>
<u>0202647A</u>	<u>UTILITY MONITORING POINT</u>	<u>LS</u>	<u>1</u>
<u>0202911A</u>	<u>CONDITION SURVEY (SITE NO. 1)</u>	<u>LS</u>	<u>1</u>
<u>0204110</u>	<u>COFFERDAM MATERIAL LEFT IN PLACE</u>	<u>SF</u>	<u>3,900</u>
<u>0904051A</u>	<u>3 TUBE CURB MOUNTED BRIDGE RAIL</u>	<u>LF</u>	<u>125</u>
<u>0922515A</u>	<u>TEMPORARY CONSTRUCTION ACCESS ROAD</u>	<u>LS</u>	<u>1</u>

REVISED CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0204001</u>	<u>COFFERDAM AND DEWATERING</u>	<u>430 LF</u>	<u>310 LF</u>

DELETED CONTRACT ITEM

<u>ITEM NO.</u>	<u>DESCRIPTION</u>	<u>ORIGINAL QUANTITY</u>	<u>REVISED QUANTITY</u>
<u>0904042</u>	<u>METAL BRIDGE RAIL (COMBINATION) (EXTRUDED ALUMINUM)</u>	<u>125 LF</u>	<u>0</u>
<u>0922509A</u>	<u>TEMPORARY CONSTRUCTION ACCESS ROAD</u>	<u>450 SY</u>	<u>0</u>

PLANS**REVISED PLANS**

The following Plan Sheets are hereby deleted and replaced with the like-numbered Plan Sheets:

02.01.A1
03.22.A1
04.02.A1
04.03.A1
04.04.A1
04.05.A1
04.13.A1
04.14.A1
04.15.A1
04.16.A1
04.19.A1
04.26.A1
04.27.A1
04.30.A1
04.31.A1
04.32.A1

The Detailed Estimate Sheets do not reflect these changes.

The Bid Proposal Form has been revised to reflect these changes.

There will be no change in the number of calendar days due to this Addendum.

The foregoing is hereby made a part of the contract.

CONTRACT TIME AND LIQUIDATED DAMAGES

Three Hundred Ninety-Nine (399) calendar days will be allowed for completion of the work on this project and the liquidated damages charge to apply will be Two Thousand Dollars (\$2,000.00) per calendar day.

In order to minimize the hazard, cost and inconvenience to the traveling public, pollution of the environment and the detriment to the business area, it is necessary to limit the time of construction work, which interferes with traffic as specified in Article 1.08.04 of the Special Provisions.

For this Contract, the assessment of milestone liquidated damages are bound to the full completion of the bulleted milestones that follow, along with all work incidental thereto, no later than November 30th, 2017. The bulleted milestones are to be completed within a timeframe in which Route 139 will be closed to vehicular traffic and a corresponding approximate one and one half (1.5) mile detour will be in effect for small vehicles and an approximate five and one half (5.5) mile detour will be in effect for trucks.

The Contractor will be assessed liquidated damages if the listed milestones are not completed by the above mentioned milestone date. The potential assessment of liquidated damages is further detailed below.

The milestones are:

- Bridge completed with parapets and guiderail bridge attachments
- Installation of metal beam rail completed.
- Curbing and pavement structure for new road completed at least through binder course
- Final signings & pavement markings
- Removal of all signs pertaining to the closure of Route 139, as shown on the Detour Plan
- Reopening of Route 139 to normal traffic operations, exclusive of temporary alternating one-way traffic operations, as specified within the contract, that may be necessary to complete the project

Prior to beginning work on the project, the Contractor shall furnish to the Engineer for approval a Critical Path Method (CPM) schedule that details all of the day-to-day operations necessary to complete the above tasks during the detour timeframe. The schedule shall include activity descriptions, activity durations and interdependence between activities. The activities are to be described so that the work is readily identifiable and the progress on each activity can be readily measured and monitored during the noted timeframe. The Contractor must also provide the anticipated number of shifts, the hours per shift, and the anticipated number of personnel staffed per shift.

The Contractor must notify the Engineer and Municipality of the proposed closure date of Route 139 at least four weeks prior to the closure. The closure shall end no later than November 30th, 2017.

Any Contractor request for an increase of the detour beyond November 30th, 2017 and a corresponding assessment of liquidated damages must justify how unforeseen circumstances outside of his control were cause for a delay in completing the above listed work by the aforementioned milestone date.

MILESTONE LIQUIDATED DAMAGES

If the Contractor fails to complete, as accepted by the Engineer, the above listed milestones by November 30th, 2017, the Contractor will be assessed a liquidated damage charge of \$9,600 (Nine Thousand Six Hundred Dollars) on the first minute after the milestone date, and shall be assessed additional liquidated damage charges at the rate of \$9,600 (Nine Thousand Six Hundred Dollars) per day thereafter until the above listed milestones are completed and accepted by the Engineer. The assessment of Milestone Liquidated Damages shall be considered separate from any Liquidated Damages assessed to the Contractor for failure to complete the project on time per Section 1.08.09 of the Form 816 Standard Specifications.

ITEM #0202647A – UTILITY MONITORING POINT

Description: This item consists of installing Utility Monitoring Points (UMPs) and monitoring movement of the sanitary sewer located downstream of Bridge No. 01358 during construction. The monitoring program shall document any settlement or horizontal movement of the sanitary sewer during construction activities. The monitoring program shall be in conformance with the minimum requirements detailed in this specification or as noted on the plans for quantity of monitoring points, intervals for recording data, procedures and period of time for reporting to the Engineer, maintenance of points, and removal of points after the completion of the work.

Materials: UMPs shall be constructed of materials suitable for use as survey reference points and as approved by the Engineer. The material shall be dimensionally stable and the points installed in a manner to allow for easily repeatable survey readings to be taken at the points.

Utility Monitoring Points shall consist of materials and dimensions as noted on the detail provided in the Plans. Alternative materials, dimensions and methods shall be submitted by the Contractor to the Engineer for approval prior to commencing construction activities.

The Contractor shall use vacuum excavation or hand digging in order to obtain access the crown of the pipe and to install monitoring points. The Contractor shall not over-excavate the pipe. The Contractor shall not be permitted to use drilling techniques to install the monitoring points. The Contractor shall take care as to not damage the existing sanitary sewer pipe.

The Contractor shall be responsible for selecting and using equipment and procedures that keep deformations and settlement of existing structures within specified tolerable levels.

The Contractor shall obtain all survey measurements using survey equipment capable of reading to a precision of 1/16-inch in both the horizontal and vertical dimension.

Construction Methods: UMPs shall be established by the Contractor for the specific purpose of providing a reliable, reproducible reference point compatible with the survey equipment to be used by the Contractor for the monitoring program.

The Contractor shall install Utility Monitoring Points at 20-foot intervals within 100-feet north and south of the Branford River and at locations approved by the Engineer. At a minimum, the Contractor shall install one UMP on either side of the Branford River downstream of the bridge. The Contractor shall install all required UMPs at least two days prior to the commencement of any construction activities.

The Contractor shall locate the settlement rod at the crown of the sanitary sewer pipe. The Contractor shall ensure that the UMP is constructed per the requirements of this special provision and per the Plans.

Monitoring Program

Initial readings shall be recorded both at the time of UMP installation and prior to the commencement of construction activities, to establish baseline readings. The Contractor shall monitor all UMPs at the following minimum intervals:

- Prior to commencement of construction activities near each UMP location.
- Immediately following:

ITEM #0202647A

- excavation occurring within 40-feet of the sanitary sewer
- cofferdam installation operations
- pile installation operations
- Daily during active construction on the adjacent Abutment 1, Abutment 2, Wingwall 1A, Wingwall 2A and permanent utility bridge
- Weekly during work on Wingwall 1B and Wingwall 2B
- After completion of construction activities within 40-feet of a UMP location.
- The next working day after a rainfall in excess of 1-inch in a 24-hour period on site.
- As directed by the Engineer

Any points that have measured movement exceeding ¼-inch shall be immediately brought to the attention of the Engineer, and construction activities in the immediate vicinity of the movement shall be ceased until any necessary corrective action has been taken or as ordered by the Engineer. The Contractor shall preform all corrective measures, damage, repair or replacement and necessary changes in construction methods at their own expense. The Contractor shall modify the means and methods associated with any construction activities that result in movement exceeding ½-inch.

Survey data shall be reduced and tabulated by the Contractor, in a format approved by the Engineer, and shall be submitted to the Engineer in hard copy format. Tabulated data shall be submitted weekly except for locations with measured movement at or exceeding ¼-inch, where the reduced data shall be submitted daily.

Maintenance and Removal

The Contractor shall maintain the UMPs during the construction phase and shall be able to re-establish or replace UMPs for all locations damaged during the time periods when monitoring is required at a given location. New baseline UMP reference data shall be established for replacement points prior to resuming construction activities at a given location.

Upon completion of the construction at a given location, the Contractor shall remove UMPs installed and restore the original condition of the affected location, unless the Engineer and Town approve abandonment of the UMPs in place.

Method of Measurement: This work, being paid on a lump sum basis, will not be measured for payment.

Basis of Payment: This work will be paid for at the contract lump sum price for the following pay item, which price shall include the furnishing and installation of UMPs, survey monitoring of UMPs at the required intervals, maintenance and protection of UMPs, replacement of damaged UMPs, removal of UMPs, the recording and processing of data, the transfer of data to the Engineer and all transportation, materials, equipment, tools and labor incidental thereto.

Pay Item

Pay Unit

Utility Monitoring Point

L.S.

ITEM #0202911A – CONDITION SURVEY (SITE NO. 1)

Description: The Contractor shall perform pre- and post-construction condition surveys of the existing sanitary sewer pipe that is adjacent to the downstream portion of the construction area associated with Bridge No. 01358.

Since the sanitary sewer is not anticipated to be exposed as part of this project, the condition surveys shall document the conditions of the interior of the sanitary sewer. The pre-construction condition survey will provide documentation of the condition of the interior of the sanitary sewer prior to the commencement of construction activities. The post-construction condition survey will provide documentation of the condition of the interior of the sanitary sewer after construction activities are completed. Additional condition surveys may be performed, as required by the Engineer. Any changes in the interior condition of the pipe, brought about by construction activities will be able to be recorded as part of condition surveys occurring after the pre-construction condition survey. Condition surveys will document, but is not limited to documenting, cracks, settlements and other existing structural defects within the sanitary sewer pipe.

Materials: The Contractor shall obtain video monitoring equipment capable of allowing them to assess the conditions of the interior of the sanitary sewer pipe.

Construction Methods: At least two days prior to the commencement of construction activities on site, the Contractor shall perform a pre-construction condition survey of the sanitary sewer pipes using video monitoring equipment.

During the pre-construction condition survey, a baseline for referencing the location of various features within the pipe shall be established by the Contractor. The observations of the condition survey shall be recorded by the Contractor including, but not limited to, observations related to existing cracks, deformations or other structural defects. Prior to the start of construction activities, the findings of the condition survey and a recording of the video shall be submitted by the Contractor to the Engineer in a format approved by the Engineer.

The Contractor shall perform a post-construction condition survey in a similar manner to the pre-construction condition survey. The Contractor shall perform the post-construction condition survey at most two days following the completion of construction activities on-site. The findings of the condition survey and a recording of the video shall be submitted by the Contractor to the Engineer in a format approved by the Engineer.

Additional condition surveys may be performed, as required by the Engineer.

A condition survey shall be performed in a way to ensure that the interior of the pipe is clearly visible via the video monitoring devices.

Method of Measurement: This work, being paid on a lump sum basis, will not be measured for payment.

Basis of Payment: Payment for this item shall be made at the contract Lump Sum price for “Condition Survey (Site No. 1)” which price shall include all condition surveys including submission of condition survey results, video monitoring equipment, and all services necessary to complete this work.

Pay Item

Condition Survey (Site No. 1)

Pay Unit

L.S.

ITEM #0202911A

ITEM #0503001A – REMOVAL OF SUPERSTRUCTURE

Work under this item shall conform to the requirements of Section 5.03 amended as follows:

5.03.01 – Description: Delete the first two paragraphs and replace with the following:

Work under this item shall consist of the removal and satisfactory disposal of the superstructure, including, but not limited to, concrete deck slab, curbs/parapets, rail posts and steel rail, bituminous wearing surface and bearings as shown on the plans or as directed by the Engineer.

The work under this item shall also consist of the removal of utilities supported by the bridge superstructure or substructure as shown on the contract plans. The removal shall be as directed by the engineer in coordination with the Utility Companies.

5.03.03 – Construction Methods: Add the following:

All work shall proceed as directed by and to the satisfaction of the Engineer in accordance with the details shown on the plans and the requirements of the Special Provisions “Maintenance and Protection of Traffic” and “Prosecution and Progress”, contained elsewhere in these Specifications.

The removal work shall be in conformance with the stipulations of permits/letter of approval issued by the Connecticut Department of Environmental Protection and the Town of Branford. Adequate measures shall be taken by the Contractor to prevent any debris, concrete chips, tools and/or materials from entering the waterway below the structure. All debris shall be promptly swept up and removed from the site.

The removal shall not result in damage to any permanent construction (new or existing) or to adjoining property. If any damage does occur it shall be repaired by the Contractor to the satisfaction of the Engineer at the Contractors expense.

The Contractor shall prepare and submit to the Engineer for review working drawings, computations, and written procedures for the removal of the existing superstructure, in accordance with Article 1.05.02. Acceptance of the Contractor’s plans shall not be considered as relieving the Contractor of any responsibility.

5.03.04 – Method of Measurement: Delete the entire article and replace with the following:

This work, being paid for on a lump sum basis, will not be measured for payment.

5.03.05 – Basis of Payment: Delete the entire article and replace with the following:

This work will be paid for at the contract lump sum price for “Removal of Superstructure”, which price shall include the removal and disposal of the superstructure components, the

containment, collection, and removal of debris as herein described, and all equipment, tools and labor incidental thereto.

Pay ItemPay Unit

Removal of Superstructure

L.S.

ITEM #0707009A - MEMBRANE WATERPROOFING (COLD LIQUID ELASTOMERIC)

Description: Work under this item consists of furnishing and installing a seamless elastomeric waterproofing membrane system applied to a concrete or steel surface as shown on the plans, in accordance with this specification and as directed by the Engineer. Work shall also include conditioning of the surface to be coated and all quality-control testing noted herein.

The completed membrane system shall be comprised of a primer coat followed by the membrane coating which is applied in one or two layers for a minimum total thickness of 80 mil (2 mm). This work shall also include an additional 40 mil (1mm) membrane layer with aggregate broadcast into the material while still wet.

Materials: The Contractor shall select a waterproofing membrane system from the Department's current Qualified Product List (QPL) for Spray-Applied Membrane Waterproofing System. All materials incorporated in the works shall meet the Manufacturer's specification for the chosen system. The Engineer will reject any system that is not on the QPL.

Materials Certificate: The Contractor shall submit to the Engineer a Materials Certificate for the primer and membrane in accordance with the requirements of Article 1.06.07.

Construction Methods: At least ten days prior to installation of the membrane system, the Contractor shall submit to the Engineer, the manufacturer's recommended procedure for preparing the deck surface, pre-treatment or preparing at cracks and gaps, treatment at curbs, vertical surfaces or discontinuities, applying the primer and membrane, and placing of aggregated coat. Procedures shall also include recommended repairs of system non-compliant issues identified during application. The system shall be applied to the prepared area(s) as defined in the plans strictly in accordance with the Manufacturer's recommendations.

A technical representative, in the direct employ of the manufacturer, shall be present on-site immediately prior to and during application of the membrane. The representative shall inspect and approve the surface prior to priming, and provide guidance on the handling, mixing and addition of components and observe application of the primer and membrane. The representative shall perform all required quality-control testing and remain on the Project site until the membrane has fully cured.

All quality-control testing, including verbal direction or observations on the day of the installation, shall be recorded and submitted to the Engineer for inclusion in the Project's records. A submittal of the quality-control testing data shall be received by project personnel prior to any paving over the finished membrane or within 24 hours following completion of any staged portion of the work.

1. **Applicator Approval:** The Contractor's membrane Applicator shall be fully trained and licensed by the membrane manufacturer and shall have successfully completed at least three spray membrane projects in the past five years. The Contractor shall furnish references from those projects, including names of contact persons and the names, addresses and phone numbers of persons who supervised the projects. This information shall be submitted to the Engineer prior to the start of construction. The Engineer shall have sole authority to determine the adequacy and compliance of the submitted information. Inadequate proof of ability to perform the work will be grounds to reject proposed applicators.

2. **Job Conditions:**

- (a) **Environmental Requirements:** Air and substrate temperatures shall be between 32°F (0°C) and 104°F (40°C) providing the substrate is above the dew point. Outside of this range, the Manufacturer shall be consulted.

The Applicator shall be provided with adequate disposal facilities for non hazardous waste generated during installation of the membrane system. The applicator shall follow safety instructions regarding respirators and safety equipment.

- (b) **Safety Requirements:** All open flames and spark producing equipment shall be removed from the work area prior to commencement of application.

"No Smoking" signs shall be visibly posted at the job site during application of the membrane waterproofing.

Personnel not involved in membrane application shall be kept out of the work area.

3. **Delivery, Storage and Handling:**

- (a) **Packaging and Shipping:** All components of the membrane system shall be delivered to the site in the Manufacturer's packaging, clearly identified with the products type and batch number.

- (b) **Storage and Protection:** The Applicator shall be provided with a storage area for all components. The area shall be cool, dry and out of direct sunlight and shall be in accordance with the Manufacturer's recommendations and relevant health and safety regulations.

Copies of Material Safety Data Sheets (MSDS) for all components shall be kept on site for review by the Engineer or other personnel.

- (c) **Shelf Life - Membrane Components:** Packaging of all membrane components shall include a shelf life date sealed by the Manufacturer. No membrane components whose shelf life has expired shall be used.

4. Surface Preparation:

- (a) Protection: The Applicator shall be responsible for the protection of equipment and adjacent areas from over spray or other contamination. Parapets and bridge joints shall be masked prior to application of the materials.
- (b) Surface Preparation: Sharp peaks and discontinuities shall be ground smooth. The surface profile of the prepared substrate is not to exceed 1/4 inch (6 mm) (peak to valley) and areas of minor surface deterioration of 1/2 inch (13 mm) and greater in depth shall also be repaired. The extent and location of the surface patches require the approval of the Engineer before the membrane system is applied.

Surfaces shall be free of oil, grease, curing compounds, loose particles, moss, algae, growth, laitance, friable matter, dirt, bituminous products, and previous waterproofing materials. If required, degreasing shall be done by detergent washing in accordance with ASTM D4258.

The surface shall be abrasively cleaned, in accordance with ASTM D4259, to provide a sound substrate free from laitance.

Voids, honeycombed areas, and blow holes on vertical surfaces shall be repaired in the same manner.

All steel components to receive membrane waterproofing shall be blast cleaned in accordance with SSPC SP6 and coated with the membrane waterproofing system within the same work shift.

5. Inspection and Testing: Prior to priming of the surface, the Engineer, Applicator and Manufacturer's technical representative shall inspect and approve the prepared substrate.

- (a) Random tests for deck moisture content shall be conducted on the substrate by the Applicator at the job site using a "Sovereign Portable Electronic Moisture Master Meter," a "Tramex CMEXpertII Concrete Moisture Meter" or approved equal. The minimum frequency shall be one test per 1000 s.f. (100 sq.m) but not less than three tests per day per bridge. Additional tests may be required if atmospheric conditions change and retest of the substrate moisture content is warranted.

The membrane system shall not be installed on substrate with a moisture content greater than that recommended by the system's manufacturer, but shall not be greater than 6%, whichever is less.

- (b) Random tests for adequate tensile bond strength shall be conducted on the substrate using an adhesion tester in accordance with the requirements of ASTM D4541. The minimum frequency shall be one test per 5,000 s.f. (500 sq.m) but not less than three adhesion tests per bridge.

Adequate surface preparation will be indicated by tensile bond strengths of primer to the substrate greater than or equal to 150 psi (1.0 MPa) or failure in a concrete surface and greater than or equal to 300 psi (2.1 MPa) for steel surfaces.

If the tensile bond strength is lower than the minimum specified, the Engineer may request additional substrate preparation. Any primer not adequately applied shall be removed and a new primer applied at the Contractor's expense, as directed by Engineer.

- (c) Cracks and grouted joints shall be treated in accordance with the Manufacturer's recommendations, as approved or directed by the Engineer.

6. Application:

- (a) The System shall be applied in four distinct steps as follows:
 - 1) Substrate preparation and gap/joint bridging preparation
 - 2) Priming
 - 3) Membrane application
 - 4) Membrane with aggregate
- (b) Immediately prior to the application of any components of the System, the surface shall be dry (see Section 5a of this specification) and any remaining dust or loose particles shall be removed using clean, dry oil-free compressed air or industrial vacuum.
- (c) Where the area to be treated is bound by a vertical surface (e.g. curb or wall), the membrane system may be continued up the vertical, as shown on the plans or as directed by the Engineer.
- (d) The handling, mixing and addition of components shall be performed in a safe manner to achieve the desired results, in accordance with the Manufacturer's recommendations or as approved or directed by the Engineer.
- (e) A neat finish with well defined boundaries and straight edges shall be provided by the Applicator.
- (f) Primer: The primer shall consist of one coat with an overall coverage rate of 125 to 175 s.f./gal (3.0 to 4.3sq.m/1) unless otherwise recommended in the manufacturer's written instructions.

All components shall be measured and mixed in accordance with the Manufacturer's recommendations.

The primer shall be spray applied using a single component spray system approved for use by the Manufacturer. If required by site conditions and allowed by the manufacturer, brush or roller application will be allowed.

The primer shall be allowed to cure tack-free for a minimum of 30 minutes or as required by the Manufacturer's instructions, whichever time is greater, prior to application of the first lift of waterproofing membrane.

Porous concrete (brick) may require a second coat of primer should the first coat be absorbed.

- (g) Membrane: The waterproofing membrane shall consist of one or two coats for a total dry film thickness of 80 mils (2 mm). If applied in two coats, the second coat shall be of a contrasting color to aid in quality assurance and inspection.

The membrane shall be comprised of Components A and B and a hardener powder which is to be added to Component B in accordance with the Manufacturer's recommendations.

The substrate shall be coated in a methodical manner.

Thickness checks: For each layer, checks for wet film thickness using a gauge pin or standard comb-type thickness gauge shall be carried out typically once every 100 s.f. (9 sq.m). Where rapid set time of the membrane does not allow for wet film thickness checks, ultrasonic testing (steel surfaces only), calibrated point-penetrating (destructive) testing, in-situ sampling (cutout of small sections for measuring thicknesses), or other methods approved by the Engineer shall be employed for determination of dry film thickness. The measured thickness of each and every individual test of the membrane shall be greater than or equal to the required thickness.

Bond Strength: Random tests for adequate tensile bond strength shall be conducted on the membrane in accordance with the requirements of ASTM D4541. The minimum test frequency shall be one test per 5,000 s.f. (500 sq.m) but no less than three adhesion tests per bridge. Adequate adhesion will be indicated by tensile bond strengths of the membrane to the substrate of greater than or equal to 150 psi (0.7 MPa) or failure in a concrete surface and greater than or equal to 300 psi (2.1 MPa) for steel surfaces.

Spark Testing: Following application of the membrane, test for pin holes in the cured membrane system over the entire application area in accordance with ASTM D4787- "Continuity Verification of Liquid or Sheet Linings Applied to Concrete Substrates." Conduct the test at voltages recommended by the manufacturer to prevent damage to the membrane.

Repair the membrane system following destructive testing and correct any deficiencies in the membrane system or substrate noted during quality-control testing in accordance with the manufacturer's recommendations to the satisfaction of the Engineer at no additional cost to the State.

- (h) Repairs: If an area is left untreated or the membrane becomes damaged, a patch repair shall be carried out to restore the integrity of the system. The damaged areas shall be cut back to sound materials and wiped with solvent (e.g. acetone) up to a width of at least four inches (100 mm) on the periphery, removing any contaminants unless otherwise recommended by the manufacturer. The substrate shall be primed as necessary, followed by the membrane. A continuous layer shall be obtained over the substrate with a four inches (100 mm) overlap onto existing membrane.

Where the membrane is to be joined to existing cured material, the new application shall overlap the existing by at least four inches (100 mm). Cleaning and surface preparation on areas to be lapped shall be as recommended in the manufacturer's written instructions.

(i) Aggregated Finish:

- 1) Apply an additional 40 mil (1 mm) thick layer of the membrane material immediately followed by an aggregate coating, before the membrane cures, at a rate to fully cover the exposed area. The membrane and aggregate shall be fully integrated after the aggregate has been applied and the membrane cured.
- 2) Localized areas not fully coated shall be touched-up with additional membrane and aggregate as needed.
- 3) Remove loose and excess aggregate from the surface to the satisfaction of the Engineer and dispose of properly after application prior to allowing traffic onto finished surface or application of tack coat.

(j) Tack Coat:

- 1) The adhesive bond tack coat shall be provided by the waterproof membrane manufacturer and be fully compatible with the liquid membrane. The tack coat shall be applied as per the manufacturer's recommendations with all the guidelines regarding surfacing strictly adhered to.
- 2) The membrane to be coated shall be clean and free from loose debris, moisture, or other contaminants. Oil, diesel fuel, or grease shall be removed with solvent approved by the manufacturer.

7. Final Review: The Engineer and the Applicator shall jointly review the area(s) over which the completed System has been installed. Any irregularities or other items that do not meet the requirements of the Engineer shall be addressed at this time.

Method of Measurement: The quantity to be paid for under this item shall be the number of square yards (square meters) of waterproofed surface completed and accepted.

Basis of Payment: This item will be paid for at the contract unit price per square yard (square meter) of "Membrane Waterproofing (Cold Liquid Elastomeric)," complete in place, which price shall include all surface preparation, furnishing, storing and applying the system, technical

representative and quality control tests, and any necessary repairs and remediation work as well as all materials, equipment, tools, labor incidental to this work.

<u>Pay Item</u>	<u>Pay Unit</u>
Membrane Waterproofing (Cold Liquid Elastomeric)	s.y. (sq.m)

ITEM #0904051A – 3 TUBE CURB MOUNTED BRIDGE RAIL

Description:

Work under this item shall consist of fabricating and installing a steel open bridge railing, consisting of steel wide flange shapes for posts and steel rectangular tube shapes for rails connected to preset anchorages, and conforming to NCHRP Report 350 TL-3 evaluation criteria, as shown on the plans, as directed by the Engineer and in accordance with this specification.

Materials:

Materials for this work shall conform to the following requirements:

- The steel rails shall be fabricated from structural steel tubing meeting the requirements of ASTM A500, Grade B, A618 or ASTM A501 with a minimum yield strength (Fr) of 50 ksi.
- Posts, plates and other shapes shall be fabricated from steel meeting the requirements of ASTM A36.
- Anchor plates and splice tube plates shall conform to AASHTO M 270 Grade 36. CVN tests are not required.
- All posts, railing, rail splices, anchorage plates, and other shapes shall be galvanized after shop fabrication in conformance with ASTM A123.
- Threaded anchor rods, heavy hex nuts, hex jamb nuts and washers shall conform to the requirements of ASTM A449.
- Bolts used for attaching the lower tubes to the posts shall conform to ASTM A325. Associated nuts shall conform to ASTM A563 Grade DH, DH3, C, C3 and D, or A194 Grades 2 or 2H. Associated washers shall conform to ASTM F436.
- Dome head bolts with wrench slots used for the top rail shall conform to ASTM A307.
- All hardware shall be hot-dip galvanized in accordance with ASTM A153.
- Leveling mortar shall conform to the requirements of non-shrink, non-staining grout as defined in M.03.05.

The Contractor shall furnish Materials Certificate in conformance with the requirements of Article 1.06.07 for the following materials: rail posts, rails, post connection devices, rail splices, preset anchorages, bolts, washers and mortar.

Construction Methods:

Shop Drawings

Before fabricating any materials, the Contractor shall submit shop drawings to the Engineer for approval in accordance with Article 1.05.02-3. These drawings shall include but not be limited to the following information: a layout plan showing post spacing, post to baseplate connection, rail to post connections, anchorage details, expansion joint locations, material designations and the name and telephone number of a person to contact who can answer questions about the shop drawings.

Fabrication

All steel, except for the anchor plates, shall be blast cleaned prior to fabrication. The blast cleaning shall conform to Steel Structures Painting Council Surface Preparation Specification "Near White Blast Cleaning" SSPC-SP10. In assembly and during welding, the component parts of built up members shall be held by sufficient clamps or by other adequate means to keep parts straight and in close contact.

Welding and fabrication of steel shall conform to the AASHTO Standard Specifications for Highway Bridges and the ANSI/AASHTO/AWS D1.5 Bridge Welding Code. If the members are tubular sections, the fabrication and welding shall conform to the ANSI/AWS D1.1 Structural Welding Code-Steel.

Prior to galvanizing, the fabricator shall ensure that all rail and rail components are smooth and without sharp protrusions that would present an injury hazard to pedestrians. Any drain holes necessary to ensure safe galvanizing shall be drilled by the fabricator.

Galvanizing

All bolts, screws, nuts, rods, and washers shall be galvanized in accordance with AASHTO M 232 and the Supplemental Specifications. The posts, base plates, backing panel components, splice tubes, and structural tubing shall be galvanized after fabrication in accordance with AASHTO M111. Backing panels should not be galvanized fully assembled, since field adjustment may be required, i.e., by racking, to align panels with the rail connections. The galvanizing bath shall contain nickel (0.05% to 0.09% by mass). Galvanized members requiring shop assembly shall be welded and drilled prior to galvanizing.

Bridge Rail Coating

Prior to applying a coat over the galvanizing, the fabricator shall ensure that all rails are smooth and without sharp protrusions that would present an injury hazard to pedestrians. Also, all welds shall be cleaned thoroughly in accordance with good practice and shall have a suitable surface to accept the primer.

A two coat painting system shall be applied by the galvanizer in his/her own facility within twelve hours of galvanizing the railing components.

The prime coat material shall be a polyamide epoxy applied to a minimum dry film thickness of 3-mil and force cured as given below for the finish coat.

The finish coat material shall be a two component, catalyzed aliphatic urethane applied by airless spray to a minimum dry film thickness of 3-mil.

Unless otherwise specified, the color shall be black, which will match Color Number 17038 of the Federal Standard 595, "Colors Used in Government Procurement". The fabricator shall submit to the Engineer for approval paint chips of the intended color prior to any work being done under this heading.

All finish coat material shall be applied under conditions within the following tolerances:

- A. Air Temperature: 508 F min, 868 F max.
- B. Surface Temperature: 508 F min, 958 F max.
- C. Humidity: 65%

The finish coat shall be cured in a booth capable of maintaining 1508 F for two to four hours.

Touch Up and Repairs

Should any damage occur to the galvanized coating during shipping or handling at the job site, the Contractor shall repair and touch up any damaged areas to the satisfaction of the Engineer and the following.

Touch up of galvanizing before finish coat is applied shall be accomplished by applying a galvanizing repair paint in accordance with the standard specifications. The dry film thickness of the applied repair paint shall not be less than 3-mil. Applications shall be in accordance with the Manufacturer's instructions.

Field touch up procedures shall conform to the recommendations of the Galvanizer. Touch up of the finish coat shall be by applying a coating of a two part urethane, as supplied by the

Galvanizer, to achieve a dry film thickness of at least 3-mil. Prior to the application of the paint, remove all damaged coatings down to a solidly adhered coating and apply galvanizing repair paint as primer. Allow the primer to dry for at least four hours.

The Contractor shall also use the touch up paint material to paint the galvanized hardware used in the field erection of the railing that has not been finish coated previously.

Replacement Stock

The Contractor shall provide additional material for future repairs. This shall include two (2) posts and a panel length (distance between posts) of each size of horizontal rail.

Setting Railing

See the contract drawings for rail post layout and spacing. Posts shall not be located closer than 15 inches to an expansion joint or end of deck and shall be spaced no more than 10 feet apart.

The anchorage assemblies shall be installed perpendicular to the grade of the gutter line. The anchorages shall be firmly and accurately held in position prior to and during the placing of concrete.

Anchorage assemblies shall conform to the requirements shown on the plans, and shall be embedded in the concrete which shall be placed to within the minimum distance of the finished surface of the curb as shown on the plans forming a construction joint for the non-shrink grout. Each bolt of the anchor bolt assembly shall be fitted with two leveling nuts.

Anchor bolt nuts for the steel bridge railing shall be tightened 1/8 turn past snug-tight conditions and shall have between 3/16 inch and 3/8 inch of exposed thread after tightening.

The top and bottom surfaces of the grout-leveling template shall be planed, or else the plate shall be hot straightened.

The grout-leveling template shall be clamped in position by 2 leveling nuts at each anchor bolt. These leveling nuts shall be adjusted to assure a truly level finished foundation surface at the proper elevation.

The space between the grout-leveling template and curb concrete shall be grouted with non-shrink, non-staining grout. The grout shall be forced by rodding or by other suitable means from one side of the template until it flows freely out at the opposite side. Care shall be taken to eliminate voids underneath the template.

Before grouting, the concrete areas that will be in contact with the grout shall be cleaned of all loose or foreign material that would in any way prevent bond between the grout and concrete surfaces. These concrete surfaces shall be kept thoroughly moistened until the surface is completely saturated prior to placing the grout. The grout shall be moisture cured for 7 days. No load shall be allowed on the grout that has been in place for less than 7 days unless otherwise approved by the Engineer.

The grout-leveling template shall remain in place for a minimum of 2 days after placement of the grout.

The post shall be set plumb except in those locations where the roadway grade is less than 1.50% in which case they shall be set normal to the grade. The rails shall follow the profile grade of the bridge at the vertical dimensions shown on the plans. When the bridge is on a vertical curve, the bridge rail shall be shop cambered to follow the profile grade of the bridge. The rails may follow chords for shallow curves if the deviation at the post from the theoretical curve is $\pm 1/2$ inch (± 13 mm) or less. Care shall be taken for bridge railing layouts with both horizontal and vertical curves and angles. Field bending of the tube sections will not be allowed.

The rails and the holes in the posts shall be constructed parallel to the gutter line. Holes may be field drilled in rails. All field drilled holes shall be coated with an approved zinc rich paint before erection.

The rails shall be carefully adjusted prior to fixing in place to insure proper matching at abutting joints and correct alignment and curvature throughout their length.

Lengths of rails shall be sufficient to be attached to at least two rail posts.

For structures having railings with a radius of 400 feet or more, the railings may be sprung into place. For structures having railings with a radius of less than 400 feet, the railing shall be curved. Curving may be done by cold bending or by hot bending.

Steel tubular railings shall be carefully adjusted prior to fixing in place to insure proper matching at abutting joints and correct alignment and curvature throughout their length.

Rail splice expansion joints shall be provided between any two posts which span an expansion joint. Bolts located at the expansion joints shall be provided with lock nuts and shall be tightened only to a point that will allow rail movement.

After installation, all rails and posts shall be free of burrs, sharp edges and irregularities.

Method of Measurement:

This work will be measured for payment by the actual number of linear feet of open bridge rail installed and accepted, measured along the rail from one rail end to the other end, as delineated on the plans.

Basis of Payment:

This work will be paid for at the contract unit price per linear foot for “3 Tube Curb Mounted Bridge Rail” complete and accepted in place, which price shall include all materials, equipment, tools, labor, and work incidental thereto.

ITEM #0922515A – TEMPORARY CONSTRUCTION ACCESS ROAD

Description:

Work under this item shall consist of the installation, maintenance and removal of temporary access roads for vehicles to access the work areas to gain access to the watercourse and areas for relocated utilities. This item also includes all work, tools, materials and labor associated with site preparation/restoration, which includes an existing topographical survey of the disturbed area, and also including but not limiting to earth excavation to the required grade, slope protection of areas beyond the access roads, borrow to restore of the impacted area to the grades shown on the plans and the reconstruction of impacted slopes.

Materials:

No. 3 Crushed Stone shall comply with the requirements of Section M.01. Geotextile (Separation) shall be of a type listed on the Connecticut DOT's Qualified Products List for High Survivability. Temporary Slope Protection shall comply with the requirements of Section 2.10. If required, new materials shall comply with Section 9.13.

Construction Methods:

Prior to construction of the temporary construction access road, the Contractor shall submit to the Engineer for review complete design calculations and plans meeting the requirements of Section 1.05.02 for the temporary construction access road.

Excavation shall be made in conformity with the requirements of the plans and as ordered by the Engineer. The access drive area shall be cleared of all roots and other objectionable material prior to geotextile placement. All excavated materials shall be stockpiled and used to restore impacted areas.

Geotextile shall be placed parallel to the access drive centerline in a loose manner to permit it to conform to the surface irregularities and prevent it from damage during stone installation. The geotextile and crushed stone shall be completely removed after use.

All slopes shall be stabilized by mulching, seeding or otherwise protected throughout use. All damaged slopes shall be repaired as soon as possible. Upon completion within the work area, the grades shall be restored to the requirements of the plans. The finished grade Turf Establishment shall be paid for separately.

Method of Measurement:

This item, being paid for on a lump sum basis, will not be measured for payment.

Basis of Payment:

This work will be paid for at the lump sum for "Temporary Construction Access Road", which price shall include all labor, materials, equipment, tools and incidentals thereto, necessary to complete this work.

Pay Item

Temporary Construction Access Road

Pay Unit

LUMP SUM (LS)